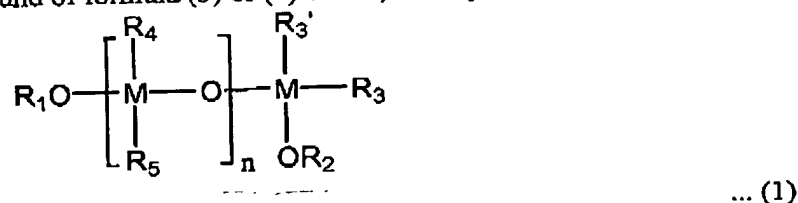


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# CLAIM AMENDMENTS

Claims 1-8. (Cancelled)

9. (Previously Presented) A spray-coated layer composition comprising a metal compound of formula (1) below, fluoroalkylsilane of formula (2) below, a mercapto compound of formula (3) or (4) below, and a polar solvent:



where M is selected from the group consisting of Si, Ti, Sn, and Zr;

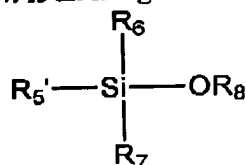
R<sub>1</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group or -M(R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>) where R<sub>14</sub>, R<sub>15</sub>, and R<sub>16</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, or a C<sub>6</sub>-C<sub>20</sub> aryl group;

R<sub>2</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group;

at least one of R<sub>3</sub> and R<sub>3</sub>' is a C<sub>1</sub>-C<sub>20</sub> alkoxy group, and the remaining group is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, a C<sub>2</sub>-C<sub>20</sub> alkylene group, or a C<sub>6</sub>-C<sub>20</sub> aryl group;

at least one of R<sub>4</sub> and R<sub>5</sub> is a C<sub>1</sub>-C<sub>20</sub> alkoxy group, and the remaining group is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>2</sub>-C<sub>20</sub> alkylene group, or a C<sub>6</sub>-C<sub>20</sub> aryl group; and

n is an integer from 0 to 20,



...(2)

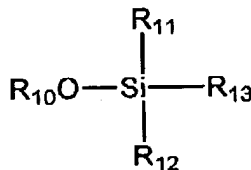
where R<sub>5</sub>' is a fluorinated C<sub>1</sub>-C<sub>20</sub> alkyl group; R<sub>6</sub> and R<sub>7</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkoxy group or a fluorinated C<sub>1</sub>-C<sub>20</sub> alkyl group; and R<sub>8</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group.



...(3)

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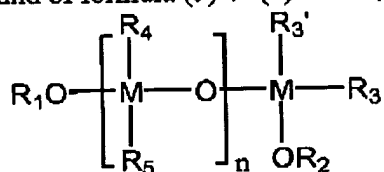
where  $R_9$  is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkyl group with a hydroxy group, a  $C_1$ - $C_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(CH_2)_kCOOH$ , where  $k$  is an integer from 1 to 10, and



...(4)

where  $R_{10}$  is a  $C_1$ - $C_{20}$  alkyl group;  $R_{11}$  and  $R_{12}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_1$ - $C_{20}$  alkyl group with a mercapto group; and  $R_{13}$  is a  $C_1$ - $C_{20}$  alkyl group with a mercapto ( $-SH$ ) group, wherein the fluoroalkylsilane of said formula (2) is at least one selected from the group consisting of heptadecafluorodecyltriethoxysilane, pentadecafluorohexyltrimethoxysilane, heptadecafluorodecyltrimethoxysilane, heptadecafluorodecyltriisopropoxysilane, heptadecafluorodecyltributoxysilane, di-(heptadecafluorodecyl) diethoxysilane, and tris-(heptadecafluorodecyl)ethoxysilane, and the fluoroalkylsilane of said formula (2) is contained in an amount of 1-15 parts by weight based on 100 parts by weight of the metal compound of formula (1).

10. (Previously Presented) A spray-coated layer composition comprising a metal compound of formula (1) below, fluoroalkylsilane of formula (2) below, a mercapto compound of formula (3) or (4) below, and a polar solvent:



...(1)

where  $M$  is selected from the group consisting of Si, Ti, Sn, and Zr;

$R_1$  is a  $C_1$ - $C_{20}$  alkyl group or  $-M(R_{14}R_{15}R_{16})$  where  $R_{14}$ ,  $R_{15}$ , and  $R_{16}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_6$ - $C_{20}$  aryl group;

$R_2$  is a  $C_1$ - $C_{20}$  alkyl group;

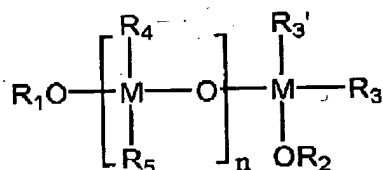


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mercaptopropyl)methoxysilane, and the mercapto compound is contained in an amount of 1-15 parts by weight based on 100 parts by weight of the metal compound of said formula (1).

Claims 11-16. (Cancelled)

17. (Previously Presented) A transparent conductive layer comprising a conductive layer containing a metal oxide and a protective layer formed on the conductive layer, the protective layer containing a hydrolyzed and polycondensated product of a metal compound of formula (1) below and at least one of a mercapto compound of formula (3) or (4) below and its hydrolyzed and polycondensated product:



...(1)

where M is selected from the group consisting of Si, Ti, Sn, and Zr;

$R_1$  is a  $C_1$ - $C_{20}$  alkyl group or  $-M(R_{14}R_{15}R_{16})$  where  $R_{14}$ ,  $R_{15}$ , and  $R_{16}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_6$ - $C_{20}$  aryl group;

$R_2$  is a  $C_1$ - $C_{20}$  alkyl group;

at least one of  $R_3$  and  $R_3'$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group;

at least one of  $R_4$  and  $R_5$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group; and

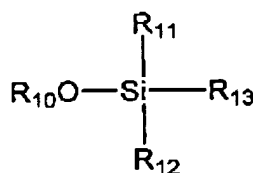
$n$  is an integer from 0 to 20,



...(3)

where  $R_9$  is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkyl group with a hydroxy group, a  $C_1$ - $C_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(CH_2)_kCOOH$ , where  $k$  is an integer from 1 to 10, and

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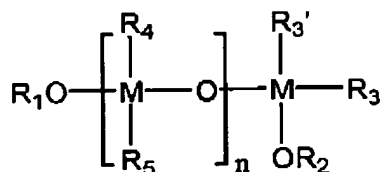


...(4)

where R<sub>10</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group; R<sub>11</sub> and R<sub>12</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, or a C<sub>1</sub>-C<sub>20</sub> alkyl group with a mercapto group; and R<sub>13</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group with a mercapto (-SH) group, wherein the mercapto compound of said formula (3) or (4) is at least one selected from the group consisting of 3-mercaptopropyltrimethoxysilane, 3-mercaptopropylmethyldimethoxysilane, 3-mercapto-1,2-propanediol, 1-mercapto-2-propanol, 3-mercaptopropionic acid, di-(3-mercaptopropyl)dimethoxysilane, and tris-(3-mercaptopropyl)methoxysilane, and the mercapto compound is contained in an amount of 1-15 parts by weight based on 100 parts by weight of the metal compound of said formula (1).

Claims 18-25. (Cancelled)

26. (Previously Presented) A transparent conductive layer comprising a conductive layer containing a metal oxide and a protective layer and spray-coated layer sequentially formed to protect the conductive layer, the spray-coated layer containing a hydrolyzed and polycondensated product of a metal compound of formula (1) below, at least one of fluoroalkylsilane of formula (2) below and its hydrolyzed and polycondensated product, and at least one of a mercapto compound of formula (3) or (4) below and its hydrolyzed and polycondensated product, and the protective layer containing a hydrolyzed and polycondensated product of the metal compound of said formula (1):



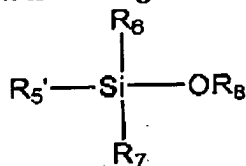
...(1)

where M is selected from the group consisting of Si, Ti, Sn, and Zr;

$R_1$  is a  $C_1$ - $C_{20}$  alkyl group or  $-M(R_{14}R_{15}R_{16})$  where  $R_{14}$ ,  $R_{15}$ , and  $R_{16}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_6$ - $C_{20}$  aryl group;

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$R_2$  is a  $C_1$ - $C_{20}$  alkyl group;  
at least one of  $R_3$  and  $R_3'$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group;  
at least one of  $R_4$  and  $R_5$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group; and  
 $n$  is an integer from 0 to 20,



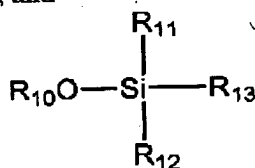
...(2)

where  $R_5'$  is a fluorinated  $C_1$ - $C_{20}$  alkyl group;  $R_6$  and  $R_7$  are, independently, a  $C_1$ - $C_{20}$  alkoxy group or a fluorinated  $C_1$ - $C_{20}$  alkyl group; and  $R_8$  is a  $C_1$ - $C_{20}$  alkyl group,



...(3)

where  $R_9$  is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkyl group with a hydroxy group, a  $C_1$ - $C_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(CH_2)_kCOOH$ , where  $k$  is an integer from 1 to 10, and



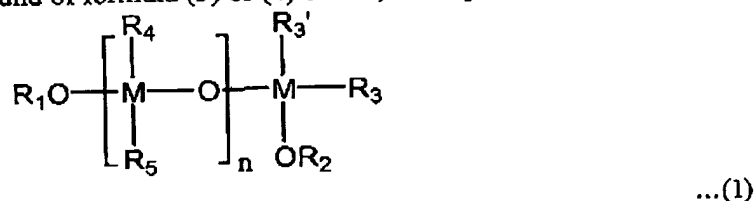
...(4)

where  $R_{10}$  is a  $C_1$ - $C_{20}$  alkyl group;  $R_{11}$  and  $R_{12}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_1$ - $C_{20}$  alkyl group with a mercapto group; and  $R_{13}$  is a  $C_1$ - $C_{20}$  alkyl group with a mercapto ( $-SH$ ) group, wherein the fluoroalkylsilane of said formula (2) is at least one selected from the group consisting of heptadecafluorodecyltriethoxysilane, pentadecafluorohexyltrimethoxysilane, heptadecafluorodecyltrimethoxysilane, heptadecafluorodecyltriisopropoxysilane, heptadecafluorodecyltributoxysilane, di-(heptadecafluorodecyl) diethoxysilane, and tris-(heptadecafluorodecyl)ethoxysilane, and the fluoroalkylsilane of said formula (2) is contained in an amount of 1-15 parts by weight based on 100 parts by weight of the metal compound of formula (1).

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Claims 27-34. (Cancelled)

35. (Previously Presented) A spray-coated layer composition comprising a metal compound of formula (1) below, fluoroalkylsilane of formula (2) below, a mercapto compound of formula (3) or (4) below, and a polar solvent:



where M is selected from the group consisting of Si, Ti, Sn, and Zr;

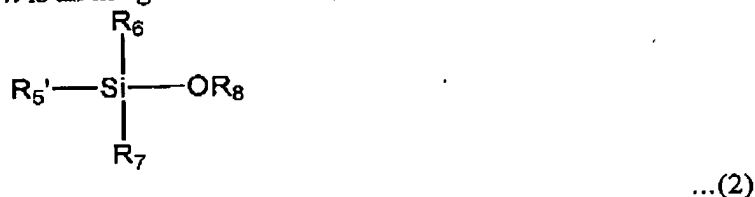
R<sub>1</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group or -M(R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>) where R<sub>14</sub>, R<sub>15</sub>, and R<sub>16</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, or a C<sub>6</sub>-C<sub>20</sub> aryl group;

R<sub>2</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group;

at least one of R<sub>3</sub> and R<sub>3</sub>' is a C<sub>1</sub>-C<sub>20</sub> alkoxy group, and the remaining group is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, a C<sub>2</sub>-C<sub>20</sub> alkylene group, or a C<sub>6</sub>-C<sub>20</sub> aryl group;

at least one of R<sub>4</sub> and R<sub>5</sub> is a C<sub>1</sub>-C<sub>20</sub> alkoxy group, and the remaining group is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>2</sub>-C<sub>20</sub> alkylene group, or a C<sub>6</sub>-C<sub>20</sub> aryl group; and

n is an integer from 0 to 20,



where R<sub>5</sub>' is a fluorinated C<sub>1</sub>-C<sub>20</sub> alkyl group; R<sub>6</sub> and R<sub>7</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkoxy group or a fluorinated C<sub>1</sub>-C<sub>20</sub> alkyl group; and R<sub>8</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group,



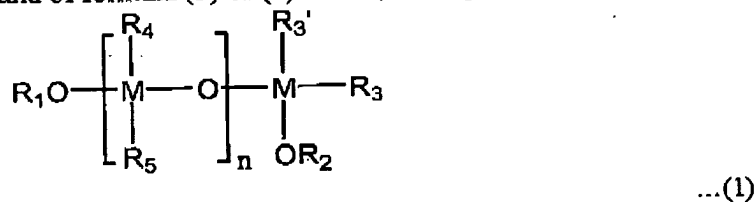
where R<sub>9</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkyl group with a hydroxy group, a C<sub>1</sub>-C<sub>20</sub> hydroxyalkyl group with a hydroxy substituent, or -(CH<sub>2</sub>)<sub>k</sub>COOH, where k is an integer from 1 to 10, and

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where  $\text{R}_{10}$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group;  $\text{R}_{11}$  and  $\text{R}_{12}$  are, independently, a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group, a  $\text{C}_1$ - $\text{C}_{20}$  alkoxy group, or a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group with a mercapto group; and  $\text{R}_{13}$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group with a mercapto (-SH) group, wherein the fluoroalkylsilane of said formula (2) is at least one selected from the group consisting of heptadecafluorodecyltriethoxysilane, pentadecafluorohexyltrimethoxysilane, heptadecafluorodecyltrimethoxysilane, heptadecafluorodecyltriisopropoxysilane, heptadecafluorodecyltributoxysilane, di-(heptadecafluorodecyl)diethoxysilane, and tris-(heptadecafluorodecyl)ethoxysilane.

36. (Previously Presented) A spray-coated layer composition comprising a metal compound of formula (1) below, fluoroalkylsilane of formula (2) below, a mercapto compound of formula (3) or (4) below, and a polar solvent:



where M is selected from the group consisting of Si, Ti, Sn, and Zr;

$\text{R}_1$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group or  $-\text{M}(\text{R}_{14}\text{R}_{15}\text{R}_{16})$  where  $\text{R}_{14}$ ,  $\text{R}_{15}$ , and  $\text{R}_{16}$  are, independently, a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group, a  $\text{C}_1$ - $\text{C}_{20}$  alkoxy group, or a  $\text{C}_6$ - $\text{C}_{20}$  aryl group;

$\text{R}_2$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group;

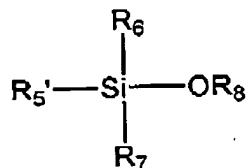
at least one of  $\text{R}_3$  and  $\text{R}_3'$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkoxy group, and the remaining group is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group, a  $\text{C}_1$ - $\text{C}_{20}$  alkoxy group, a  $\text{C}_2$ - $\text{C}_{20}$  alkylene group, or a  $\text{C}_6$ - $\text{C}_{20}$  aryl group;

at least one of  $\text{R}_4$  and  $\text{R}_5$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkoxy group, and the remaining group is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group, a  $\text{C}_2$ - $\text{C}_{20}$  alkylene group, or a  $\text{C}_6$ - $\text{C}_{20}$  aryl group; and

$n$  is an integer from 0 to 20,



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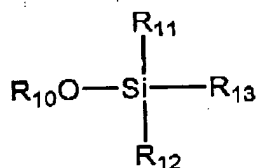
...(2)

where  $\text{R}_5'$  is a fluorinated  $\text{C}_1$ - $\text{C}_{20}$  alkyl group;  $\text{R}_6$  and  $\text{R}_7$  are, independently, a  $\text{C}_1$ - $\text{C}_{20}$  alkoxy group or a fluorinated  $\text{C}_1$ - $\text{C}_{20}$  alkyl group; and  $\text{R}_8$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group,



...(3)

where  $\text{R}_9$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group, a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group with a hydroxy group, a  $\text{C}_1$ - $\text{C}_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(\text{CH}_2)_k\text{COOH}$ , where  $k$  is an integer from 1 to 10, and

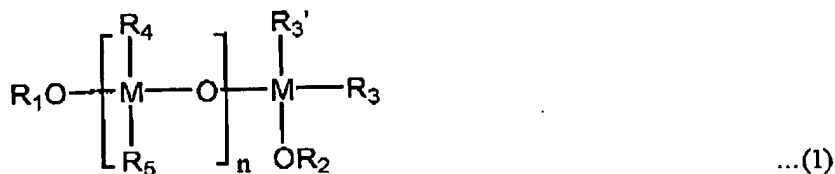


...(4)

where  $\text{R}_{10}$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group;  $\text{R}_{11}$  and  $\text{R}_{12}$  are, independently, a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group, a  $\text{C}_1$ - $\text{C}_{20}$  alkoxy group, or a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group with a mercapto group; and  $\text{R}_{13}$  is a  $\text{C}_1$ - $\text{C}_{20}$  alkyl group with a mercapto ( $-\text{SH}$ ) group, wherein the mercapto compound of said formula (3) or (4) is at least one selected from the group consisting of 3-mercaptopropyltrimethoxysilane, 3-mercaptopropylmethyldimethoxysilane, 3-mercaptopropyl-1,2-propanediol, 1-mercaptopropyl-2-propanol, 3-mercaptopropionic acid, di-(3-mercaptopropyl)dimethoxysilane, and tris-(3-mercaptopropyl)methoxysilane.

37. (Previously Presented) A transparent conductive layer comprising a conductive layer containing a metal oxide and a protective layer formed on the conductive layer, the protective layer containing a hydrolyzed and polycondensated product of a metal compound of formula (1) below and at least one of a mercapto compound of formula (3) or (4) below and its hydrolyzed and polycondensated product:

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where M is selected from the group consisting of Si, Ti, Sn, and Zr;

$R_1$  is a  $C_1$ - $C_{20}$  alkyl group or  $-M(R_{14}R_{15}R_{16})$  where  $R_{14}$ ,  $R_{15}$ , and  $R_{16}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_6$ - $C_{20}$  aryl group;

$R_2$  is a  $C_1$ - $C_{20}$  alkyl group;

at least one of  $R_3$  and  $R_3'$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group;

at least one of  $R_4$  and  $R_5$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group; and

$n$  is an integer from 0 to 20,



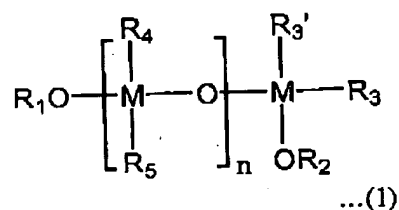
where  $R_9$  is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkyl group with a hydroxy group, a  $C_1$ - $C_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(CH_2)_kCOOH$ , where  $k$  is an integer from 1 to 10, and



where  $R_{10}$  is a  $C_1$ - $C_{20}$  alkyl group;  $R_{11}$  and  $R_{12}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_1$ - $C_{20}$  alkyl group with a mercapto group; and  $R_{13}$  is a  $C_1$ - $C_{20}$  alkyl group with a mercapto ( $-SH$ ) group, wherein the mercapto compound of said formula (3) or (4) is at least one selected from the group consisting of 3-mercaptopropyltrimethoxysilane, 3-mercaptopropylmethyldimethoxysilane, 3-mercaptopropyl-1,2-propanediol, 1-mercaptopropyl-2-propanol, 3-mercaptopropionic acid, di-(3-mercaptopropyl)dimethoxysilane, and tris-(3-mercaptopropyl)dimethoxysilane.

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38. (Previously Presented) A transparent conductive layer comprising a conductive layer containing a metal oxide and a protective layer and spray-coated layer sequentially formed to protect the conductive layer, the spray-coated layer containing a hydrolyzed and polycondensated product of a metal compound of formula (1) below, at least one of fluoroalkylsilane of formula (2) below and its hydrolyzed and polycondensated product, and at least one of a mercapto compound of formula (3) or (4) below and its hydrolyzed and polycondensated product, and the protective layer containing a hydrolyzed and polycondensated product of the metal compound of said formula (1):



where M is selected from the group consisting of Si, Ti, Sn, and Zr;

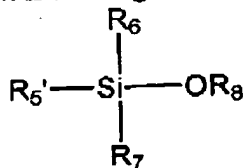
R<sub>1</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group or -M(R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>) where R<sub>14</sub>, R<sub>15</sub>, and R<sub>16</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, or a C<sub>6</sub>-C<sub>20</sub> aryl group;

R<sub>2</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group;

at least one of R<sub>3</sub> and R<sub>3</sub>' is a C<sub>1</sub>-C<sub>20</sub> alkoxy group, and the remaining group is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, a C<sub>2</sub>-C<sub>20</sub> alkylene group, or a C<sub>6</sub>-C<sub>20</sub> aryl group;

at least one of R<sub>4</sub> and R<sub>5</sub> is a C<sub>1</sub>-C<sub>20</sub> alkoxy group, and the remaining group is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>2</sub>-C<sub>20</sub> alkylene group, or a C<sub>6</sub>-C<sub>20</sub> aryl group; and

n is an integer from 0 to 20,



...(2)

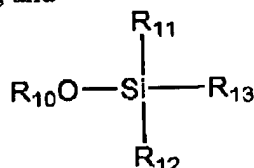
where R<sub>5</sub>' is a fluorinated C<sub>1</sub>-C<sub>20</sub> alkyl group; R<sub>6</sub> and R<sub>7</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkoxy group or a fluorinated C<sub>1</sub>-C<sub>20</sub> alkyl group; and R<sub>8</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group,



...(3)

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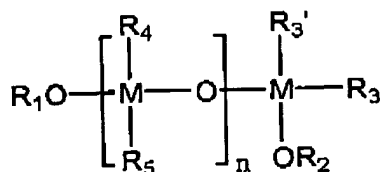
where  $R_9$  is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkyl group with a hydroxy group, a  $C_1$ - $C_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(CH_2)_kCOOH$ , where  $k$  is an integer from 1 to 10, and



...(4)

where  $R_{10}$  is a  $C_1$ - $C_{20}$  alkyl group;  $R_{11}$  and  $R_{12}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_1$ - $C_{20}$  alkyl group with a mercapto group; and  $R_{13}$  is a  $C_1$ - $C_{20}$  alkyl group with a mercapto ( $-SH$ ) group, wherein the mercapto compound of said formula (3) or (4) is at least one selected from the group consisting of 3-mercaptopropyltrimethoxysilane, 3-mercaptopropylmethyldimethoxysilane, 3-mercaptopropyl-1,2-propanediol, 1-mercaptopropyl-2-propanol, 3-mercaptopropionic acid, di-(3-mercaptopropyl)dimethoxysilane, and tris-(3-mercaptopropyl)methoxysilane.

39. (New) A transparent conductive layer comprising a conductive layer containing a metal oxide and a protective layer formed on the conductive layer, the protective layer containing a hydrolyzed and polycondensated product of a metal compound of formula (1) below and at least one of a mercapto compound of formula (3) or (4) below and its hydrolyzed and polycondensated product:



...(1)

where  $M$  is selected from the group consisting of Si, Ti, Sn, and Zr;

$R_1$  is a  $C_1$ - $C_{20}$  alkyl group or  $-M(R_{14}R_{15}R_{16})$  where  $R_{14}$ ,  $R_{15}$ , and  $R_{16}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_6$ - $C_{20}$  aryl group;

$R_2$  is a  $C_1$ - $C_{20}$  alkyl group;

at least one of  $R_3$  and  $R_3'$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group;

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at least one of  $R_4$  and  $R_5$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group; and  
 $n$  is an integer from 0 to 20,



where  $R_9$  is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkyl group with a hydroxy group, a  $C_1$ - $C_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(CH_2)_kCOOH$ , where  $k$  is an integer from 1 to 10, and



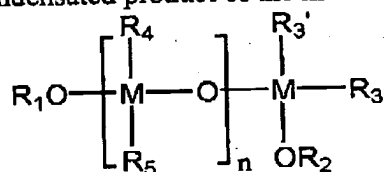
where  $R_{10}$  is a  $C_1$ - $C_{20}$  alkyl group;  $R_{11}$  and  $R_{12}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_1$ - $C_{20}$  alkyl group with a mercapto group; and  $R_{13}$  is a  $C_1$ - $C_{20}$  alkyl group with a mercapto ( $-SH$ ) group, the transparent conductive layer further comprising, on the protective layer, a non-continuous coating layer containing a hydrolyzed and polycondensated product of the metal compound of said formula (1), at least one of fluoroalkylsilane of formula (2) below and its hydrolyzed and polycondensated product, and at least one of a mercapto compound of said formula (3) or (4) and its hydrolyzed and polycondensated product:



where  $R_5'$  is a fluorinated  $C_1$ - $C_{20}$  alkyl group;  $R_6$  and  $R_7$  are, independently, a  $C_1$ - $C_{20}$  alkoxy group or a fluorinated  $C_1$ - $C_{20}$  alkyl group; and  $R_8$  is a  $C_1$ - $C_{20}$  alkyl group.

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40. (New) A transparent conductive layer comprising a conductive layer containing a metal oxide and a protective layer and a non-continuous coating layer sequentially formed to protect the conductive layer, the non-continuous coating layer containing a hydrolyzed and polycondensated product of a metal compound of formula (1) below, at least one of fluoroalkylsilane of formula (2) below and its hydrolyzed and polycondensated product, and at least one of a mercapto compound of formula (3) or (4) below and its hydrolyzed and polycondensated product, and the protective layer containing a hydrolyzed and polycondensated product of the metal compound of said formula (1):



...(1)

where M is selected from the group consisting of Si, Ti, Sn, and Zr;

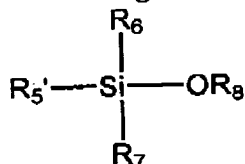
R<sub>1</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group or -M(R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>) where R<sub>14</sub>, R<sub>15</sub>, and R<sub>16</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, or a C<sub>6</sub>-C<sub>20</sub> aryl group;

R<sub>2</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group;

at least one of R<sub>3</sub> and R<sub>3</sub>' is a C<sub>1</sub>-C<sub>20</sub> alkoxy group, and the remaining group is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>1</sub>-C<sub>20</sub> alkoxy group, a C<sub>2</sub>-C<sub>20</sub> alkylene group, or a C<sub>6</sub>-C<sub>20</sub> aryl group;

at least one of R<sub>4</sub> and R<sub>5</sub> is a C<sub>1</sub>-C<sub>20</sub> alkoxy group, and the remaining group is a C<sub>1</sub>-C<sub>20</sub> alkyl group, a C<sub>2</sub>-C<sub>20</sub> alkylene group, or a C<sub>6</sub>-C<sub>20</sub> aryl group; and

n is an integer from 0 to 20,



...(2)

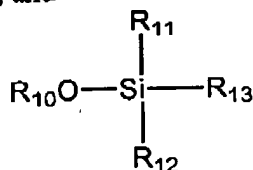
where R<sub>5</sub>' is a fluorinated C<sub>1</sub>-C<sub>20</sub> alkyl group; R<sub>6</sub> and R<sub>7</sub> are, independently, a C<sub>1</sub>-C<sub>20</sub> alkoxy group or a fluorinated C<sub>1</sub>-C<sub>20</sub> alkyl group; and R<sub>8</sub> is a C<sub>1</sub>-C<sub>20</sub> alkyl group,



...(3)

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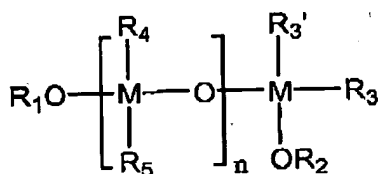
where  $R_9$  is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkyl group with a hydroxy group, a  $C_1$ - $C_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(CH_2)_kCOOH$ , where  $k$  is an integer from 1 to 10, and



...(4)

where  $R_{10}$  is a  $C_1$ - $C_{20}$  alkyl group;  $R_{11}$  and  $R_{12}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_1$ - $C_{20}$  alkyl group with a mercapto group; and  $R_{13}$  is a  $C_1$ - $C_{20}$  alkyl group with a mercapto ( $-SH$ ) group.

41. (New) A transparent conductive layer comprising a conductive layer containing a metal oxide and a protective layer and non-continuous coating layer sequentially formed to protect the conductive layer, the non-continuous coating layer containing a hydrolyzed and polycondensated product of a metal compound of formula (1) below, at least one of fluoroalkylsilane of formula (2) below and its hydrolyzed and polycondensated product, and at least one of a mercapto compound of formula (3) or (4) below and its hydrolyzed and polycondensated product, and the protective layer containing a hydrolyzed and polycondensated product of the metal compound of said formula (1):



...(1)

where  $M$  is selected from the group consisting of Si, Ti, Sn, and Zr;

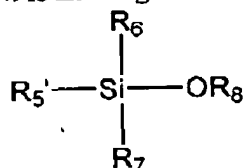
$R_1$  is a  $C_1$ - $C_{20}$  alkyl group or  $-M(R_{14}R_{15}R_{16})$  where  $R_{14}$ ,  $R_{15}$ , and  $R_{16}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_6$ - $C_{20}$  aryl group;

$R_2$  is a  $C_1$ - $C_{20}$  alkyl group;

at least one of  $R_3$  and  $R_3'$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group;

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at least one of  $R_4$  and  $R_5$  is a  $C_1$ - $C_{20}$  alkoxy group, and the remaining group is a  $C_1$ - $C_{20}$  alkyl group, a  $C_2$ - $C_{20}$  alkylene group, or a  $C_6$ - $C_{20}$  aryl group; and  
 $n$  is an integer from 0 to 20,



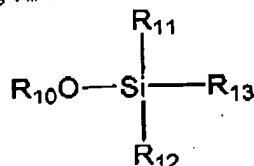
...(2)

where  $R_5'$  is a fluorinated  $C_1$ - $C_{20}$  alkyl group;  $R_6$  and  $R_7$  are, independently, a  $C_1$ - $C_{20}$  alkoxy group or a fluorinated  $C_1$ - $C_{20}$  alkyl group; and  $R_8$  is a  $C_1$ - $C_{20}$  alkyl group,



...(3)

where  $R_9$  is a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkyl group with a hydroxy group, a  $C_1$ - $C_{20}$  hydroxyalkyl group with a hydroxy substituent, or  $-(CH_2)_kCOOH$ , where  $k$  is an integer from 1 to 10, and



...(4)

where  $R_{10}$  is a  $C_1$ - $C_{20}$  alkyl group;  $R_{11}$  and  $R_{12}$  are, independently, a  $C_1$ - $C_{20}$  alkyl group, a  $C_1$ - $C_{20}$  alkoxy group, or a  $C_1$ - $C_{20}$  alkyl group with a mercapto group; and  $R_{13}$  is a  $C_1$ - $C_{20}$  alkyl group with a mercapto (-SH) group, wherein the mercapto compound of said formula (3) or (4) is at least one selected from the group consisting of 3-mercaptopropyltrimethoxysilane, 3-mercaptopropylmethyldimethoxysilane, 3-mercaptopropylmethyldimethoxydimethoxysilane, 3-mercaptopropylmethyldimethoxytrimethoxysilane, 1-mercaptopropyltrimethoxysilane, 1-mercaptopropylmethyldimethoxysilane, 1-mercaptopropylmethyldimethoxydimethoxysilane, 1-mercaptopropylmethyldimethoxytrimethoxysilane, 3-mercaptopropionic acid, di-(3-mercaptopropyl)dimethoxysilane, and tris-(3-mercaptopropyl)dimethoxysilane, and the mercapto compound is contained in an amount of 1-15 parts by weight based on 100 parts by weight of the metal compound of said formula (1).